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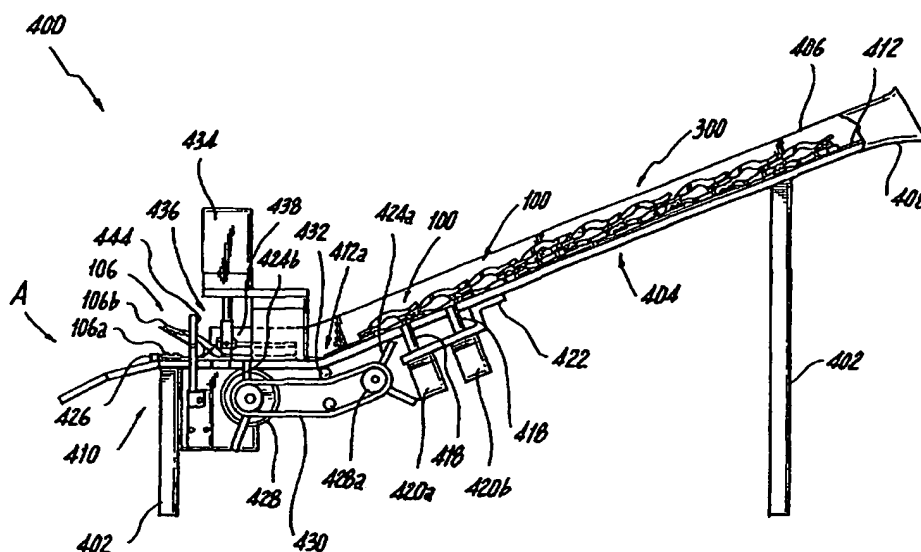
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(54) Title: AUTOMATIC LOADING APPARATUS FOR NESTABLE PINCH-GRIP HANGERS



(57) Abstract: An apparatus (400) for loading garments on individual pinch-grip hangers (100, 200) from a nest (300, 400) of pinch-grip hangers. The apparatus includes: a hopper (406) for holding the nests of pinch-grip hangers, each of the individual pinch-grip hangers nesting in a stack of similar hangers such that each of the individual pinch-grip hangers interlocks in the stack of similar hangers; a singulation mechanism (416a, 416b) for singulating an individual pinch-grip hanger from the nest of pinch-grip hangers; and a loading mechanism (410) for loading a garment on the singulated individual pinch-grip hanger.

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AUTOMATIC LOADING APPARATUS FOR NESTABLE
PINCH-GRIP HANGERS

5 CROSS REFERENCE TO RELATED APPLICATIONS

 This application is a continuation-in-part of co-pending U.S. Application Serial Nos. 10/076,789 filed February 15, 2002, 10/076,790, filed February 15, 2002, and 10/292,128, filed November 12, 2002, the contents of
10 which are incorporated herein by their reference. This application is related to U.S. Application Serial No. 10,____,____ filed on the same day herewith (attorney Docket 14785YZ), the entire contents of which is also incorporated herein by its reference.

15 BACKGROUND OF THE INVENTION

 1. Field of the Invention

 The present invention relates generally to automated machinery for loading garments on hangers, and more particularly, to loading garments on nestable
20 pinch-grip hangers. The pinch grip hangers are used for hanging pants and skirts for shipment to retailers and display of the same in a retail environment. The improved pinch-grip hangers are nestable in stacks and as such, are less costly to ship with or without
25 garments attached thereto and easier to feed into automated production machinery for insertion of garments thereon.

 2. Prior Art

 Consumer taste and fashion have dictated a
30 desire for mass-produced, but well-fitted garments, which are distributed and sold throughout the United States. Large national retailers of clothing generally

contract with a plurality of clothing manufacturers to produce uniform standardized clothing, which is essentially identical from batch to batch, even though manufactured by different entities. These manufacturers
5 in turn produce the clothing at their own plants, or in many cases, subcontract the production of the garments to manufacturers based in the Far East, for instance, in Hong Kong, Taiwan, Singapore and South Korea.

In the retail clothing industry clothing is
10 typically suspended from hangers at the point of purchase. Such hangers are often inexpensive ship-on types and under prevailing garment-on-hanger programs, the garment is shipped from the manufacturer to the retailer while suspended from a hanger. Traditional
15 garment-on-hanger pant and skirt hangers used spring clips that were manually pushed into a locking position to secure the pants or skirts to the hanger. In these hangers, a steel-retaining clip was manually clamped over a clamshell garment grip to secure the garment.
20 Use of the hangers in this device required a manual operation to slide the steel clip over the clamshell to close the retention clip on the garment.

However, these hangers were not popular as the physical force needed to close a hanger on a thick waist
25 band could result in increased time and labor costs to load the hanger and complaints of inadvertently broken finger nails were common. For these reasons, pinch grip hangers have become popular in recent years. However, pinch grip hangers generally have greater depth than
30 clip hangers, resulting in fewer garments per rod or per loop when shipping the garments, and a tendency to inadvertently drop the garments when subjected to unexpected shipping loads, as adjacent hangers impact

one another and open one or more of the pinch grips. The pinch-grip hangers of the prior art are typically recycled after purchase of the garment thereon. The hangers are generally shipped in quantity in shipping
5 containers. The cost of shipping the hangers is a function of the weight and cube (volume) of the container. Because of the size and shape of the pinch-grip hangers of the prior art, the volume of the container is not used effectively to hold the hangers.
10 This leads to increased shipping costs.

Inadvertent opening of the pinch grips can also occur in a retail store environment, as customers push the garments to one side to better view a garment of interest. Various guards have been proposed in the
15 prior art to prevent the inadvertent opening of the pinch grips, but these guards further contribute to increased depth for the product.

The pinch grip hangers of the prior art are loaded manually, since both pinch grips are normally
20 biased to a closed position by a spring and both must be opened to load a garment into the grips. At the present time this requires an operator to perform four steps. Using one hand the operator must open the first pinch grip and then using the other hand to suspend the
25 garment, one side of the garment is placed in the grip.

This process is then repeated for the other pinch grip. With the second pinch grip the operator must also simultaneously tension the garment between the clips, and since both hands are already occupied, the
30 tensioning step may require additional manual movements.

At a minimum, four manual steps or movements are required for each garment that is loaded, resulting in relatively high labor costs for loading the garments.

These prior art hangers are difficult to automate as they are not designed to stack load in a magazine, and they frequently have a single pair of projecting high points that cause the hangers to not
5 stack evenly in a magazine. Further, the high points can result in the hanger snagging on the next to be fed hanger in an automated feed mechanism.

SUMMARY OF THE INVENTION

Therefore it is an object of the present
10 invention to provide a nestable pinch-grip hanger capable of nesting in a stack of pinch-grip hangers which can be accommodated in a magazine of an automated production machine for feeding the pinch-grip hangers from the stack into the production machine for further
15 processing therein.

Accordingly, an apparatus for loading garments on individual pinch-grip hangers from a nest of pinch-grip hangers is provided. The apparatus comprising: a hopper for holding the nests of pinch-grip hangers, each
20 of the individual pinch-grip hangers in the nest of pinch-grip hangers having a body, two pinch grips disposed on the body for retaining a garment therein, and nesting means for nesting the individual pinch-grip hanger in a stack of similar hangers such that the
25 individual pinch-grip hanger interlocks with the stack of similar hangers; singulation means for singulating an individual pinch-grip hanger from the nest of pinch-grip hangers; and loading means for loading a garment on the singulated individual pinch-grip hanger.

30 Also provided is a method for loading a garment on an individual pinch-grip hanger from a nest of pinch-grip hangers, the method comprising: (a)

loading the nest of pinch-grip hangers, each of the individual pinch-grip hangers in the nest of pinch-grip hangers having a body, two pinch grips disposed on the body for retaining a garment therein, and nesting means
5 for nesting the individual pinch-grip hanger in a stack of similar hangers such that the individual pinch-grip hanger interlocks with the stack of similar hangers; (b) singulating an individual pinch-grip hanger from the nest of pinch-grip hangers; and (c) loading a garment on
10 the singulated individual pinch-grip hanger.

Preferably, the singulating comprises releasing a first individual hanger from the nest of hangers while retaining the remaining individual hangers from the nest of hangers, the released first individual
15 hanger being the singulated individual hanger. In which case, the loading of a garment on the singulated individual pinch-grip hanger preferably comprises moving the singulated individual hanger to a loading portion for loading of the garment on the singulated individual
20 pinch-grip hanger. The method preferably further comprises repeating steps (b) and (c) for the remaining individual pinch-grip hangers in the nest of pinch-grip hangers.

BRIEF DESCRIPTION OF THE DRAWINGS

25 These and other features, aspects, and advantages of the apparatus and methods of the present invention will become better understood with regard to the following description, appended claims, and accompanying drawings where:

30 Figure 1A illustrates a front view of a preferred implementation of a nestable pinch-grip hanger having an integrally molded hook member.

Figure 1B illustrates a top view of the nestable pinch-grip hanger of Figure 1A.

Figure 1C illustrates a partial isometric view of the nestable pinch-grip hanger of Figure 1A.

5 Figure 2A illustrates a front view of a preferred implementation of a nestable pinch-grip hanger having a metal wire hook member rotatably disposed in the body of the hanger.

10 Figure 2B illustrates a top view of the nestable pinch-grip hanger of Figure 2A.

Figure 2C illustrates a partial isometric view of the nestable pinch-grip hanger of Figure 2A.

Figure 3 illustrates a partial isometric view of one of the pinch-grips of the hanger of Figure 1A.

15 Figure 4 illustrates a sectional view of the pinch grip of Figure 3 as taken along line 4-4 in Figure 3.

Figure 5A illustrates a front view of a stack of the nestable hangers as shown in Figure 1A.

20

Figure 5B illustrates a front view of a stack of the nestable hangers as shown in Figure 2A.

Figure 6 illustrates a side view of the stack of nestable hangers of Figure 5A.

25 Figure 7A illustrates a sectional view of the stack of nestable hangers of Figure 5A as taken along line 7A-7A in Figure 5A.

Figure 7B illustrates a partial isometric view of the stack of nestable hangers of Figure 5A.

Figure 8 illustrates a top view of a shipping container having a plurality of the stacks of nestable
5 hangers of Figure 5A.

Figure 9 illustrates an isometric view of the shipping container of Figure 8 having a cut-away portion showing the stacks of nestable hangers therein.

Figures 10A and 10C illustrate an end view of
10 a first and second version, respectively, of a first embodiment of a size indicator of the present invention for engaging the first web of the hanger illustrated in Figure. 1A.

Figure 10B illustrates a top view of the size
15 indicators of Figures 10A and 10C.

Figure 11A illustrates an enlarged view of the first web of Figure 1A.

Figure 11B illustrates the enlarged view of the web of Figure 11A with a size indicator secured
20 thereon.

Figure 12A illustrates a partial sectional view of the web of Figure 11A as taken along line 12A-12A thereof and additionally having the second version of the size indicator secured thereon.

25 Figure 12B illustrates the first web and the size indicator of Figure 12A wherein the pivoting latch is being pivoted to release the size indicator therefrom.

Figure 13 illustrates a side view of a preferred implementation of an automated apparatus for loading garments onto the pinch grip hangers of the present invention.

- 5 Figure 14 illustrates a top view of the apparatus of Figure 13 with brackets and pneumatic cylinders removed for clarity.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

- Preferred implementations of the improved
10 pinch grip hanger of the present invention are illustrated in Figures 1A-1C and 2A-2C and referred to generally by reference numerals 100 and 200, respectively. The improved pinch grip hanger 100, 200 is molded of plastic with a support means 102, 202 for
15 supportably hanging the hanger on a display. The hanger further has a body 104, 204 supported by the support means 102, 202. The body 104, 204 has two pinch grips 106, 206 disposed thereon for retaining a garment. As will be described below, the hanger 100, 200 includes
20 nesting means for nesting the hanger in a stack of similar hangers such that the hanger interlocks with the stack of similar hangers. For purposes of this disclosure, "interlocks" means that the relative motion between hangers in the stack is restricted by some
25 degree. Although, the degree of restriction may require an applied force to separate the hangers from one another, such an applied force is not necessary. For example, in the preferred implementation discussed below, the nestable hangers in the stack can be
30 separated easily from one another, however, each hanger is shaped and/or configured to "fit" or nest with at least one other hanger in the stack analogous to the nesting of outdoor resin chairs. Furthermore, the

nestable hanger preferably nests in a plane substantially parallel with a plane of the stack of similar hangers and more preferably in substantially a same plane as the stack of similar hangers. For the
5 purpose of this disclosure, nesting of a hanger in a plane substantially parallel with a plane of the stack of similar hangers where the planes are not the same plane will be referred to as vertical nesting, while nesting of a hanger in a plane substantially parallel
10 with a plane of the stack of similar hangers where the planes are the same plane will be referred to as horizontal nesting. Although, the nestable hanger is described and shown herein in a horizontal nesting configuration, such is done by way of example only and
15 not to limit the spirit or scope of the present invention.

In the hanger of Figures 1A-1C, the support means is an upwardly extended hook member 108 formed of plastic and integrally molded with the body 104. As
20 illustrated in Figures 2A-2C, an alternative hanger 200 is shown therein in which the hanger is fitted with a wire metal hook 208 that is swivel mounted in the body 204 in a manner well known in the art. The hook member 108 can include an upstanding flange member (not shown)
25 that is adapted to receive a size indicia (not shown) for a characteristic of the garment suspended in the hanger, such as a size indicator permanently affixed to the hook member 108 as taught by U.S. Patent No. 5,604,975 or the size indicator releasably secured to
30 the hook member 108 as taught by U.S. Patent No. 5,794,363. Both of these patents are assigned to the assignee of the present invention, and the disclosures of both patents are incorporated herein by reference

thereto.

As discussed more fully below and illustrated in Figures 1A-1C, the present invention may also be fitted with a pivoting flange to receive a side sizer in the matter taught in U.S. Patent No. 6,260,745, also assigned to the assignee of the present invention. The disclosure of this patent is also incorporated herein by reference thereto. Preferably, such a side sizer is disposed on a transition portion between the hook member 108 and the body 104 of the hanger 100.

As illustrated in Figures 1A-1C and 2A-2C, the body 104, 204 of the pinch grip hanger is a horizontally extending support bar 110, 210. The support bar 110, 210 includes the pinch grips 106 positioned on either end 110a, 110b, 210a, 210b of the support bar 110, 210.

Although many different shape cross-sections are possible, the central support bar 110, 210 is preferably formed of a square M-shaped cross-section that provides exceptional strength along the vertical axis of the hanger. Each of the pinch grips 106, 206 include first and second pinch grip jaws 106a, 106b, 206a, 206b with the first jaw members 106a, 206a being integrally molded with the support bar 104, 204. The second jaw members 106b, 206b are pivotally secured to the first jaw members 106a, 206a at a pivot mounting 112, 212, by a spring member 114, 214, as will be hereinafter discussed in detail. Each of the pinch grip jaws 106a, 106b, 206a, 206b define garment-engaging areas 116, 216. Each of the moveable first and second jaw members 106a, 106b, 206a, 206b also have an actuation end 118a, 118b, 218a, 218b used to open the pinch grip 106, 206 and pinch ends 119a, 119b, 219a, 219b. Each of the first and second jaw members 106a, 106b, 206a, 206b are molded with teeth

120, 220 where the teeth 120, 220 are preferably staggered so that they do not directly oppose each other. Alternatively, each of the first and second jaw members 106a, 106b, 206a, 206b are fitted with a molded non-slip pad (not shown). Thus, the pinch ends 119a, 119b, 219a, 219b are biased together by the spring member 114, 214 and are actuated apart by an actuation force applied at the actuation ends 118a, 118b, 218a, 218b.

10 Referring now to Figures 5A and 5B, there is shown stacks of hangers 100, 200, generally referred to by reference numerals 300, 400, respectively. As discussed above, although the hangers 100, 200 can be nested in either a horizontal or vertical nesting configuration, the horizontal configuration is shown by way of example only and not to limit the spirit or scope of the present invention. Furthermore, although the nests 300, 400 of hangers 100, 200 are shown with three individual hangers 100, 200 in the nest 300, 400, those skilled in the art will appreciate that any number of individual hangers 100, 200 greater than two can be nested without departing from the spirit or scope of the present invention. Still further, the nesting of hangers 100, 200 will be described and shown in Figures 6 and 7A with more specificity with regard to hangers 100. Unless otherwise noted, the nesting of hangers 200 is similarly configured to that shown and described with regard to hangers 100.

Referring now to Figures 6 and 7A, the nesting means can comprise the actuatable ends 118a, 118b, 218a, 218b defining a pocket 124 having a shape and size larger than a size and shape of the pinch ends 119a, 119b, 219a, 219b such that the pinch ends 119a, 119b,

219a, 219b are accommodated into a corresponding pocket 124 of the individual hangers 100, 200 in the stack of hangers 300, 400. The pocket 124 preferably accommodates enough of the pinch ends 119a, 119b, 219a, 219b to provide a stable stack of nesting hangers 300, 400. However, those skilled in the art will appreciate that the pinch ends 119a, 119b, 219a, 219b need not positively lock into the pocket 124, such as by a press fit or interference with a protrusion in the pocket 124, it is sufficient that the pinch ends 119a, 119b, 219a, 219b be loosely secured in the pocket 124.

Referring now to Figures 1B and 2B, the nesting means can also comprise alone or in addition to that described above, the pinch grips 106, 206 being equidistant from the hook 108, 208 on opposite ends of the body 104, 204 in a first direction (indicated by arrow A) and the pinch grips 106, 206 further being offset in a second direction (indicated by arrow B) orthogonal to the first direction by an amount equal to a thickness of at least a portion of a corresponding hook member 104, 204 in the stack of individual similar hangers 300, 400. Preferably the amount of offset in the direction of arrow B is substantially equal to the thickness of the corresponding hook member 104, 204. As shown in Figures 5A and 5B the offset facilitates nesting of the hangers 100, 200 in the horizontal stacking configuration.

Referring now to Figures 1C, 5A and 7B where the support means comprises the integrally formed hook member 108 the nesting means can also include alone or in combination with that described above, the body 104, 204 having a cut-out portion 122 corresponding to at least a portion of the hook member 104 on the stack of

similar hangers 300, 400 to accommodate the hook member 104 in the stack of similar hangers 300, 400 while nested together in the stack.

Referring now to Figures 3 and 4, the hangers
5 100, 200 further comprise means for preventing inadvertent actuation of the pinch ends 119a, 119b, 219a, 219b while a garment is inserted between the pinch ends 119a, 119b, 219a, 219b. The means for preventing inadvertent actuation of the pinch ends 119a, 119b,
10 219a, 219b can comprise at least one guard member 126 disposed on the actuation end 118a, 218a, of the first jaw 106a, 206a. The at least one guard member 124 projects outwardly from the first jaw 106a, 206a towards the actuation end 118b, 218b of the second jaw 106b,
15 206b such that an inadvertent actuation force F is at least partially blocked from being applied to the actuation end 118b, 218b of the second jaw 106b, 206b. The means for preventing inadvertent actuation of the pinch ends 119a, 119b, 219a, 219b can also comprise,
20 alone or in combination with that described above, at least one of the first and second jaws 106a, 206a, 106b, 206b having a shape such that a widest portion W of the pinch grip 106, 206 in a direction orthogonal to the axis of rotation R is below the axis of rotation R .
25 Figure 4 illustrates the widest portion W of the pinch grip 106, 206 being due to a convexly curved portion 126 formed on the second jaw 106b, 206b. Thus, any object which is pressed against the second jaw 106b, 206b will likely be applied against the convexly curved portion
30 126 and will tend to keep the first and second jaws 106a, 206a, 106b, 206b closed rather than tend to open the jaws.

Referring now to Figures 8 and 9, therein is

illustrated a container of hangers, the container being generally referred to by reference numeral 500. Although, the container is shown having hangers 100 disposed therein, those skilled in the art will appreciate that hangers 200 can also be disposed therein without departing from the scope or spirit of the present invention. Generally, the container 500 is a shipping container and has walls 502 (including a bottom) defining an interior 504. The container can have a top 506 or be open at the top. Furthermore, the container 500 can be fabricated from numerous materials known in the art for shipping containers, such as cardboard, or plastic. A plurality of stacks of hangers 300 are disposed in the interior 504 where each of the individual stacks of hangers 300 comprise a plurality of nestable hangers 100 as described above. Although, the stacks of hangers 300 are shown having 12 individual hangers 100 in a horizontal nesting configuration, those skilled in the art will appreciate that any number of individual hangers greater than one in either a horizontal or vertical nesting configuration may be disposed in the container 500 without departing from the scope or spirit of the present invention. Furthermore, although the container 500 is shown having several stacks of hangers 300 disposed therein, those skilled in the art will appreciate that any number of stacks of hangers 300 greater than one can be disposed in the container 500 without departing from the scope or spirit of the present invention.

Those skilled in the art will appreciate that the novel nesting hangers 100, 200 and nesting stacks thereof 300, 400 provide for greater shipping density than would be possible with pinch-grip hangers of the

prior art which are loosely packaged in containers. Those skilled in the art will also appreciate that the nesting means, particularly due to the offset and cut-out discussed above, also provide for greater display density when garments are disposed thereon and the hangers are hung from a display. Furthermore, the means for preventing inadvertent actuation discussed above, provides means for inadvertent actuation of the pinch grips 106, 206 when a garment is retained by the pinch grips 106, 206 when the hangers 100, 200 are both hung from a display and while being transported with the garments retained thereon.

Referring now to Figure 11a, the hanger 100 preferably has a web 128 having a fixed latch 140 and a pivoting latch 142. The pivoting latch 142 is preferably located at a central portion of the web 128 and the fixed latch 140 is located on at least one end of the pivoting latch 142. Preferably, the fixed latch 140, as shown in Figure 11a, comprises two abutments 140a, 140b located on each end of the pivoting latch 142. As illustrated in Figures 12a and 12b, it is also preferable that the pivoting latch 142 projects from a first side 144 of the web 128 and the fixed latch 140 projects from an opposite side 146 of the web 128.

Referring back to Figure 11a, the pivoting latch 142 is preferably defined by a slot 148 cut through the web 128. The slot preferably has a shape defined by at least two sides 148a, 148b. The pivoting latch 142 is further defined by a living hinge, shown by dotted line 130 closing the shape of the slot 148. As shown in Figure 11a, the slot 148 is preferably substantially two sided 148a, 148b and the living hinge 130 closes the shape of the slot 148 thereby forming a

triangular shaped pivoting latch 142.

Referring now to Figures 11a, 11b, and 11a in combination, the pivoting latch 142 preferably has an engagement means for facilitating movement of the pivoting latch about arrow A shown in Figures 11b. The engagement means preferably comprises a cantilevered end 122 of the pivoting latch 142 which when a releasing force (F_R) is applied thereto provides a mechanical advantage for movement of the pivoting latch 142 out of engagement with the size indicator. Simultaneously, the opposite side of the pivoting latch 142 displaces the size indicator such that it no longer engages the fixed latch 140.

Referring now to Figures 10a, 10b, and 10a in combination, two versions of the size indicator are illustrated as 150 and 150a, with size indicator 150 generally having a face 160 and two sides 162, 164 depending therefrom to form a generally C-shaped channel 166. Each of the sides 162, 164 terminate in a foremost edge 131, 132. The foremost edges 131, 132 are preferably configured such that the cantilevered end 168 of the pivoting latch 142 is exposed when a size indicator 150 is secured on the web 128.

The size indicator 150 includes finger means 134 for engaging the fixed and pivoting latches 140, 142, respectively, such that the size indicator is secured on the web during normal use. However, the size indicator is releasably secured on the web 128 such that it may be released from the web 128 when the pivoting latch 142 is pivoted out of engagement with the finger means 134 of the size indicator when the release force (F_R) is applied. The finger means 134 preferably

comprises an inwardly facing ridge 134a, 134b disposed at each of the foremost edges 131, 132 and projecting inwards towards the channel 166 of the size indicator 150.

5 In an alternative version, a second size indicator 150a of the first embodiment is illustrated in Figure 10c in which like reference numerals refer to similar features, the second size indicator being referred to generally by reference numeral 150a. The
10 second size indicator 150a has engagement abutments 162a and 164a which protrude from the inside of the sides 162, 164, respectively, to touch the side walls of the fixed and pivoting latches 140, 142 when secured to the web 128. As will be discussed below, the size indicator
15 150a further has a pair of spaced projections 160a, 160b projecting from an inner surface of the face 160.

Referring back to Figures 11a and 11a in combination, the web 128 preferably also has a guard 136 extending across the web 128 and below the size
20 indicator 150a. In a preferred implementation, the guard 136 has a down-turned portion 138, which follows the contours of the cantilevered end 168 to thereby enable access to the edges of the size indicator, and the engagement means prevents inadvertent actuation of
25 the pivoting latch 142. The cantilevered end 168 and engagement means are preferably configured to engage a tool (not shown) used for application of the releasing force (F_R). The engagement means is preferably a dimple 141 formed on a side of the cantilevered end 168. The
30 tool having a tip substantially conforming to the shape of the dimple 141 and having a width such that it is not prevented from engaging the dimple 141 by the guard 136.

The web preferably also has an outermost edge 128d having an outermost portion 128e of a predetermined cross-section. The first version of the size indicator 150 has a trough 170c (Figure 10a) with a mating cross-section substantially configured to receive the outermost portion 128e therein for preventing a lateral movement of the size indicator along direction E-E (Figure 12a) when the size indicator 150 is secured on the web 128. The preferable predetermined cross-section of both the outermost portion 128e and the trough 170 is substantially rectangular. The second version of the size indicator 150a having first and second spaced projections 160a and 160b, respectively, which project from the inner surface of the face 160. The first and second projections 160a, 160b are spaced such that the outermost portion 128e is accepted therein when the size indicator 150a is secured on the web 128 to prevent lateral movement of the size indicator 150a along direction E-E (illustrated in Figure 12a).

The engagement abutments 162a, 164a cooperate with the trough 170 or the first and second spaced projections 160a, 160b to prevent side-to-side movement of the size indicator on the web and contribute to a secure and solid attachment of the size indicator to the hanger.

Referring to Figure 11b, the web 128 further comprises locating means for locating the size indicators 150, 150a in a predetermined position on the web 128. The locating means preferably comprises first and second guides 146a, 146b disposed adjacent each side edge 148a, 148b of the size indicator 150, 150a and spaced apart to align the size indicators therebetween

and to center the size indicators during application thereof on the web 128. Preferably, the first and second guides 146a, 146b do not extend the full length of the side edges 148a, 148b of the size indicator but
5 define elongate openings 150a, 150b which expose the side edges 148a, 148b of the size indicator.

Referring now to Figures 12a and 12a, the operation of the garment hanger 100 of the present invention will be explained with regard to size
10 indicator 150a. Size indicator 150a is mounted on the web 128 by sliding it over web 128 in the direction of arrow C. While being mounted in the direction of arrow C, the pivoting latch 142 pivots in the direction of arrow G until the inwardly facing ridges 134a, 134b of
15 finger means 134 pass over the fixed and pivoting ridges 140, 142. After which, the inwardly facing fingers 134a, 134b snap into place in an area defined by the guide 136 and a bottom edge of the fixed and pivoting ridges 140, 142. As such, the size indicator 150a is
20 releasably secured on the web 12B.

To release the size indicators 150, 150a from the web 128, a releasing force (F_R) is applied to the cantilevered end 168 of the pivoting latch 142, preferably by engaging the dimple 141 thereon with a
25 release tool (not shown). The release force (F_R) results in the pivoting latch 142 to pivot about the living hinge 130 in the direction of arrow G. As can be seen in Figures 12a and 12b, planar side wall of the pivoting latch 142 causes the inner ridge 134a of the finger
30 means 134 of size indicators 150, 150a to extend past the furthest extending portion of the fixed latch 140. At this point, the size indicator 150, 150a may be manually removed from the web 128.

Referring now to Figures 13 and 14, there is illustrated an automated apparatus for loading (alternatively referred to as inserting) garments into the pinch grip hangers 100 of the present invention, the apparatus being generally referred to by reference numeral 400. Although, hanger 100 is shown being loaded in apparatus 400, those skilled in the art will appreciate that hanger 200 may also be used without departing from the scope or spirit of the present invention. Furthermore, although the apparatus 400 is shown with regard to a horizontal nest 300 of hangers, those skilled in the art will appreciate that a vertical nest can also be used with the apparatus modified accordingly to accommodate and feed the vertical nest.

The apparatus 400 has legs 402 for supporting a platform 404. The platform 404 has a rectangular tray portion 406 for holding at least one nest 300 of hangers having the movable jaw member 106b facing upwards away from the platform 404. The tray portion 406 may have a tapered lead-in portion 408 facilitating the loading of the nest 300 into the tray 406. The platform 404 further has a loading portion 410 where each of the individual hangers 100 in the nest 300 are loaded with a garment between the first and second jaw members 106a, 106b of the pinch grips 106. Although not shown, the legs 402 are provided with braces to add stability to the apparatus 400. Preferably, as described below, the tray portion 406 has a lower surface 412 upon which the nest of hangers 300 lies and which is inclined such that the hangers 100 are at least partially fed from the tray portion 406 to the loading portion 410 by gravity. A transition portion 412a of the lower surface 412 between the tray portion 406 and loading portion 410 is

preferably curved, such curve is preferably very gradual, i.e., has a large radius. The platform further has two channels 414 in the lower surface 412 such that pushing and locating pins (discussed below) can
5 communicate with the hangers 100 from below the lower surface 412.

Each of the individual hangers 100 in the nest of hangers 300 is preferably singulated from the nest 300 and fed to the loading portion 410. Therefore, the
10 nest of hangers 300 are held in the tray portion 406 by front and rear pairs of locating pins 416a, 416b. Each of the locating pins 416a, 416b are preferably connected to or integral with a shaft 418 of a first and second pairs of pneumatic cylinders 420a, 420b, respectively.
15 Of course, both of the locating pins for each pair can be connected to a single pneumatic cylinder. The first and second pairs of pneumatic cylinders 420a, 420b are held in place under the lower surface 412 of the platform 404 by a bracket 422 such that the pins 416a,
20 416b communicate with the channels 414. The first and second pneumatic cylinders 420a, 420b, are actuated between retracted and extended positions to retract the pins 416a, 416b below the lower surface 412 or extend above the lower surface 412 to engage the hangers 100,
25 respectively.

Each of the first locating pins 416a engage a lower edge 110c of the support bar 110 of a first hanger 100 in the nest, while each of the second locating pins 416b engage a lower edge 110c of the support bar 110 of
30 a second hanger 100 in the nest 300. The pair of first locating pins 416a are retracted to free the first hanger 100 in the nest from the nest 300 due to the effect of gravity from the inclined surface of the tray

portion 406 while the pair of second locating pins 416b are extended to restrict the movement of the second and remaining hangers 100 in the nest 300. After the first hanger 100 in the nest 300 is free from the nest 300,
5 the pair of first locating pins 416a are again extended and the pair of second locating pins 416b are retracted to allow the remaining hangers 100 in the nest to engage the first pair of locating pins 416a due to the effect of gravity. Although not necessary, a sensor may be
10 used to detect the singulation of the first hanger 100 in the nest 300 from the nest before the first pair of locating pins 416a are extended. A means for vibrating the lower surface 412 may also be used with or without the sensor to ensure the singulation of the first hanger
15 100 from the nest 300. Such means are well known in the art, such as an eccentric motor operatively engaged with the lower surface 412.

Once the first hanger 100 in the nest 300 has been singulated from the nest 300, a pair of pushing
20 pins 424 move through the channels 414 to push the singulated hanger 110 through the curved transition portion 412a to the loading portion 410. Preferably, the singulated hanger 100 is located at a proper position in the loading portion, such as by pushing the
25 singulated hanger 100 against a pair of shallow stops 426 corresponding to each of a forward edge of the fixed jaw member 106a. At this point, the pushing pins 424 stop moving, which can be determined by exceeding a predetermined torque in pushing motors (described below)
30 or positioning a sensor in the stops 426 or on an appropriate position on the lower surface 412 of the platform 404 in the vicinity of the loading portion 410.

The means for supporting and moving the pushing pins 424 is preferably as shown in Figure 13. Such means includes a pushing motor 428a and main pulley 428b supported under the lower surface 412 in the vicinity of the channels 414 by brackets (not shown). The pushing motor 428a and main pulley 428b are interconnected by a belt 430. The pushing pins 424 are carried on the belt 430 and run in the same longitudinal direction as the channels 412. An idler pulley 432 may be necessary to conform the shape of the belt to the corresponding shape of the lower portion 412 of the platform 404. Once the singulated hanger 100 is free from the nest, the pushing motor 428a is activated to rotate the belt 430 counterclockwise causing rearward pushing pins 424a to emerge from the lower surface 412 and engage with the singulated hanger 100. The rearward pushing pins 424a continue to travel towards the loading portion 410 to push the singulated hanger therewith to the loading portion 410 until the singulated hanger 100 is appropriately positioned at the loading portion 410, as discussed above. While the rearward pushing pins 424a push the singulated hanger 100 towards the loading portion 410, frontward pushing pins 424b are free to move towards a rearward position (since, as described below, the previous singulated hanger has been mated with a garment and removed, therefore no longer being an impediment to the continued travel of the forward pushing pins 424b). Of course, the pushing pins 424 can also be moved linearly, such as by a linear motor, ball screw, and the like.

The apparatus 400 further has first and second pinch grip actuators 434 (shown in phantom in Figure 14). The first and second pinch grip actuators 434 are

preferably pneumatic cylinders and have an actuation rod 436 corresponding with the actuation ends 118b of the movable jaw members 106b for each of the pinch grips 106 of the singulated hanger 100. Once the singulated
5 hanger 100 has been located at the loading portion 410 such that the actuation rods 436 correspond with the actuation end 118b of the movable jaw members 106b, the actuation rods 436 are extended, as shown in Figure 13, to open the movable jaw member 106b relative to the
10 fixed jaw member 106a. Since the movable jaw member 106b rotates while the actuation rod 436 translates, a roller 438 is provided the end of each actuation rod to facilitate the relative movement between the end of the actuation rod 436 and the actuation end 118b of the
15 movable jaw members 106b.

Once the pinch grips 106 are open, an operator manually inserts a garment in the direction of arrow A into the open pinch grips 106. Upon the insertion of the garment, the garment engages a lever sensor 440
20 which retracts the actuator rods 436 to close the pinch grips 106 on the garment, thereby securing the garment on the hanger 100. The operator then manually removes the garment and attached hanger 100 from the loading portion 410 by pulling on the garment thereby releasing
25 engagement of the garment on the lever sensor 440. Upon the release of engagement of the garment with the lever sensor 440 the first pair of locating pins 416a are retracted to singulate the next hanger 100 in the nest of hangers 300. The sequence described above then
30 repeats for all of the hangers in the nest 300. Additional nests 300 can be loaded into the tray portion 406 before all of the hangers 100 from the previous nest have been processed because the new nest 300 will nest

with the remaining hangers 100 from the old nest 300.
In this way, the garment loading process does not have
to be stopped for loading of the hangers 100.
Furthermore, several nests of hangers 300 can be stacked
5 above each other, each on their own tray portion, and,
the nests or the trays themselves can be fed into the
position shown in Figure 13 after a previous nest has
been processed.

Although, the powering and sequencing of the
10 above components of the apparatus 400 can be done
manually, they are preferably under the control of a
central programmable processor (not shown) that controls
and sequences the components in an automated fashion.
Thus, the only manual intervention necessary is for the
15 loading of the nests of hangers 300 into the tray
portion 406, the insertion of a garment between the open
jaw members 106a, 106b of the pinch grips 106, and the
removal of the garment and attached hanger from the
platform after the jaw members 106a, 106b have been
20 closed on the garment.

While there has been shown and described what
is considered to be preferred embodiments of the
invention, it will, of course, be understood that
various modifications and changes in form or detail
25 could readily be made without departing from the spirit
of the invention. It is therefore intended that the
invention be not limited to the exact forms described
and illustrated, but should be constructed to cover all
modifications that may fall within the scope of the
30 appended claims.

WHAT IS CLAIMED IS:

1. An apparatus for loading garments on individual pinch-grip hangers from a nest of pinch-grip hangers, the apparatus comprising:
 - 5 a hopper for holding the nests of pinch-grip hangers, each of the individual pinch-grip hangers in the nest of pinch-grip hangers having a body, two pinch grips disposed on the body for retaining a garment therein, and nesting means for nesting the individual
 - 10 pinch-grip hanger in a stack of similar hangers such that the individual pinch-grip hanger interlocks with the stack of similar hangers;
 - singulation means for singulating an individual pinch-grip hanger from the nest of pinch-grip
 - 15 hangers; and
 - loading means for loading a garment on the singulated individual pinch-grip hanger.
2. The apparatus of claim 1, wherein the hopper is a platform having a tray portion for holding
- 20 the nest of pinch-grip hangers on a lower surface thereof.
3. The apparatus of claim 2, wherein the tray portion has a tapered lead-in portion for facilitating loading of the nest of pinch-grip hangers therein.
- 25 4. The apparatus of claim 2, wherein the platform further has a loading portion at which the garment is loaded onto the singulated pinch grip hanger.

5. The apparatus of claim 2, wherein the platform further has a transition portion between the tray portion and loading portion.

6. The apparatus of claim 5, wherein the lower surface is inclined towards the loading portion.

7. The apparatus of claim 6, wherein the singulation means comprises releasing means for releasing a first pinch-grip hanger to be singulated from the nest of pinch-grip hangers while remaining hangers in the nest of pinch-grip hangers are retained.

8. The apparatus of claim 7, wherein the releasing means comprises first and second pairs of locating pins selectively actuated between extended and retracted positions, the first pair of location pins engaging a first pinch-grip hanger to be singulated in the nest of pinch-grip hangers when in the extended position and releasing the first pinch-grip hanger when in the retracted position, the second pair of location pins engaging the remaining pinch-grip hangers in the nest of pinch-grip hangers when in the extended position for retaining the remaining pinch-grip hangers.

9. The apparatus of claim 6, wherein the loading means comprises moving means for moving the singulated pinch-grip hanger from the tray portion, through the transition portion, and into the loading portion.

10. The apparatus of claim 9, further comprising locating means for locating the singulated pinch-grip hanger at a predetermined loading position at the loading portion.

5 11. The apparatus of claim 10, wherein the locating means comprises a shallow stop corresponding to each of the two pinch grips of the singulated hanger wherein the singulated hanger is pushed against the shallow stops.

10 12. The apparatus of claim 9, wherein the moving means comprises a pair of loading pins selectively engagable with the singulated pinch-grip hanger and movable from the tray portion to the loading portion, wherein the pair of loading pins are extended
15 into the tray portion to engage the singulated pinch-grip hanger and push the singulated pinch-grip hanger to the loading portion.

 13. The apparatus of claim 9, wherein the loading means further comprises means for opening the
20 two pinch grips of the singulated pinch-grip hanger while at the loading portion such that the garment can be inserted therein.

 14. The apparatus of claim 13, wherein the means for opening the two pinch grips comprises an
25 actuatable cylinder corresponding to each of the two pinch grips of the singulated pinch-grip hanger for engaging a movable jaw member of each of the two pinch

grips for moving the movable jaw members to thereby open each of the two pinch grips.

15. The apparatus of claim 14, further comprising sensor means for detecting the loading of the garment on the singulated pinch-grip hanger for closing the pinch grips to fix the garment therein.

16. The apparatus of claim 15, wherein the sensor means further detects the removal of the loaded singulated pinch-grip hanger and initiating the singulation of a subsequent remaining pinch-grip hanger in the nest of pinch-grip hangers.

17. A method for loading a garment on an individual pinch-grip hanger from a nest of pinch-grip hangers, the method comprising:

15 (a) loading the nest of pinch-grip hangers, each of the individual pinch-grip hangers in the nest of pinch-grip hangers having a body, two pinch grips disposed on the body for retaining a garment therein, and nesting means for nesting the individual pinch-grip hanger in a stack of similar hangers such that the individual pinch-grip hanger interlocks with the stack of similar hangers;

(b) singulating an individual pinch-grip hanger from the nest of pinch-grip hangers; and

25 (c) loading a garment on the singulated individual pinch-grip hanger.

18. The method of claim 17, wherein the singulating comprises releasing a first individual hanger from the nest of hangers while retaining the

remaining individual hangers from the nest of hangers,
the released first individual hanger being the
singulated individual hanger.

19. The method of claim 18, wherein the
5 loading of a garment on the singulated individual pinch-
grip hanger comprises moving the singulated individual
hanger to a loading portion for loading of the garment
on the singulated individual pinch-grip hanger.

20. The method of claim 19, further
10 comprising repeating steps (b) and (c) for the remaining
individual pinch-grip hangers in the nest of pinch-grip
hangers.

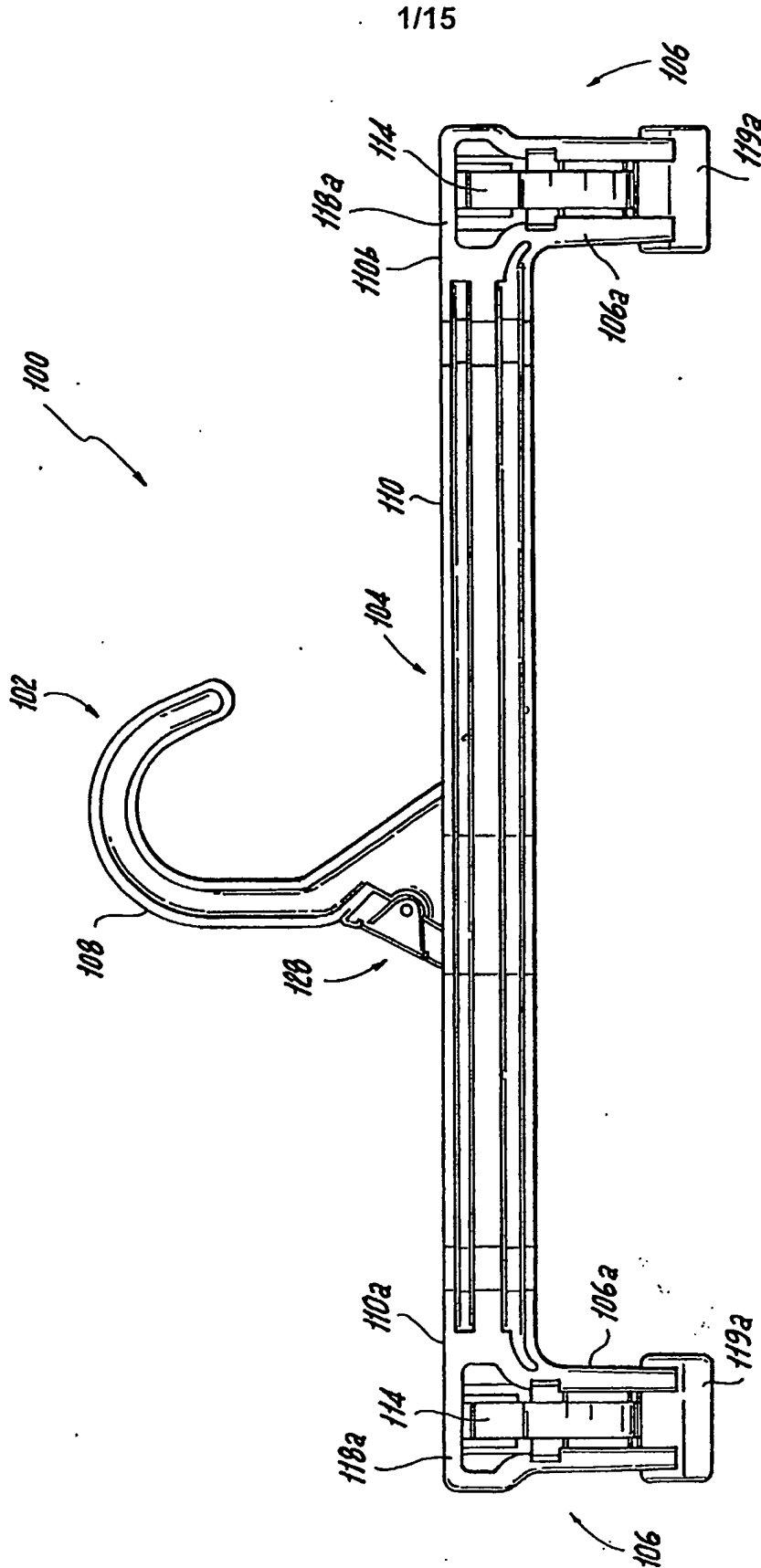


Figure 1(a)

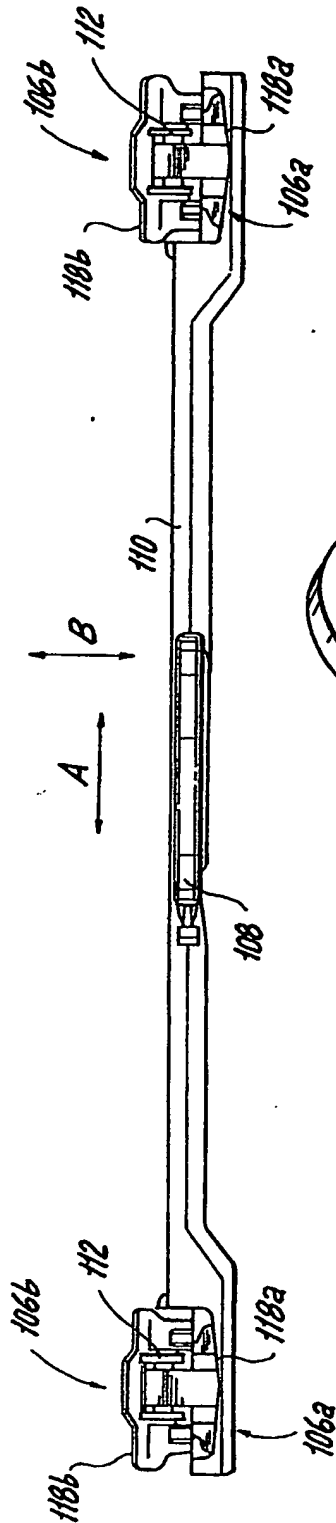


Figure 1(b)

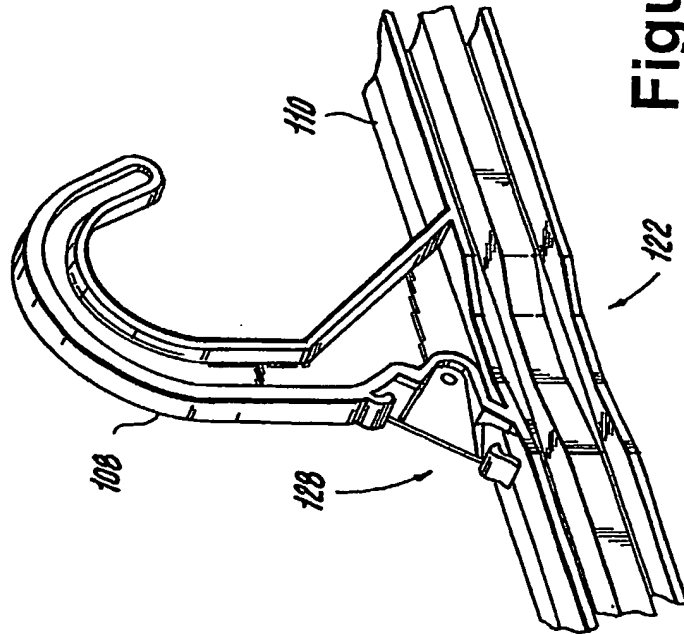


Figure 1(c)

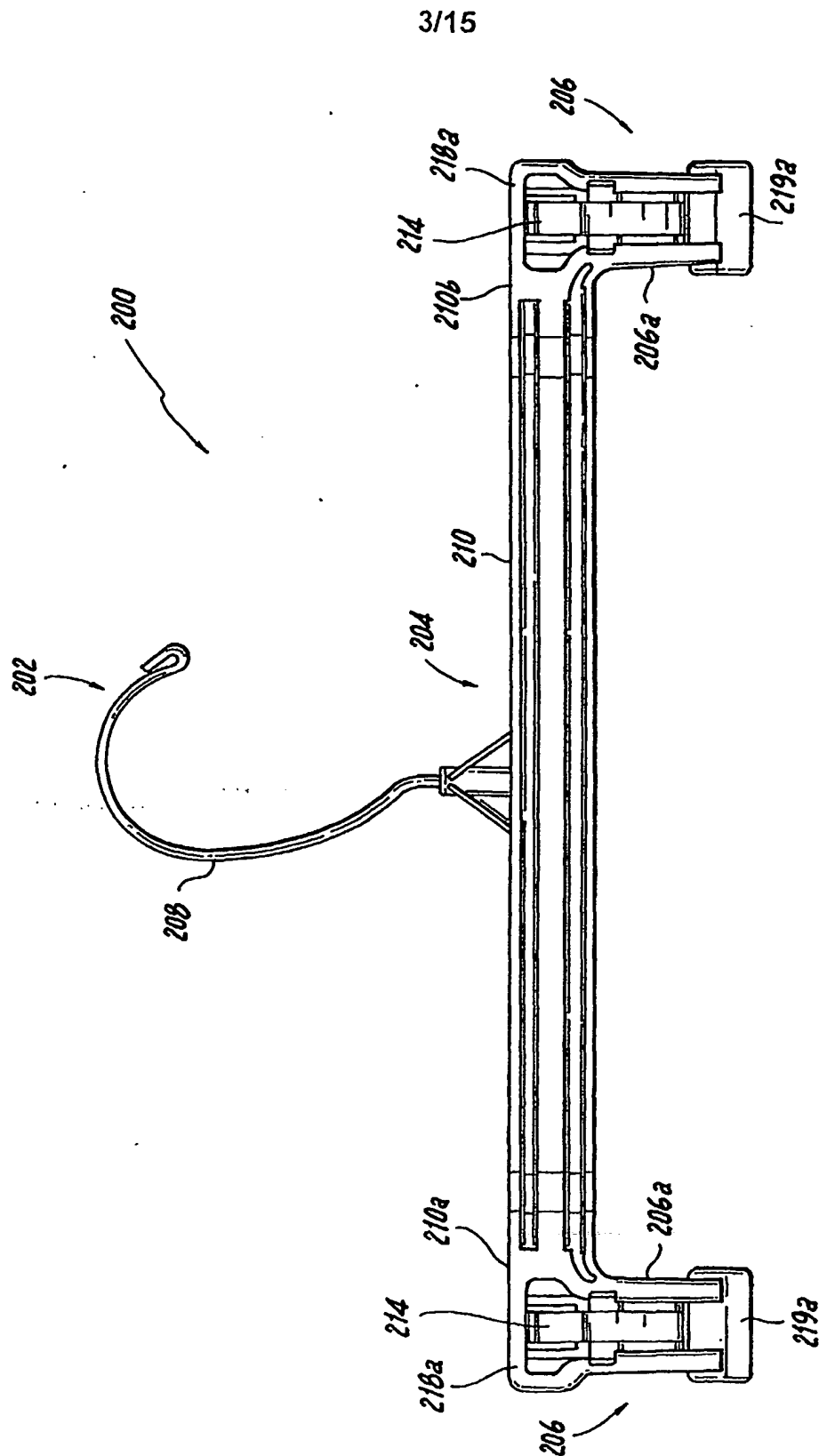


Figure 2(a)

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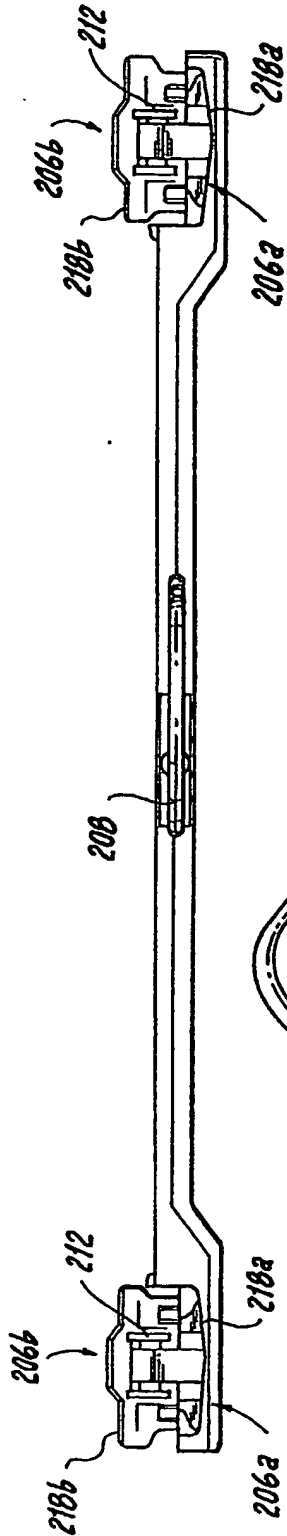


Figure 2(b)

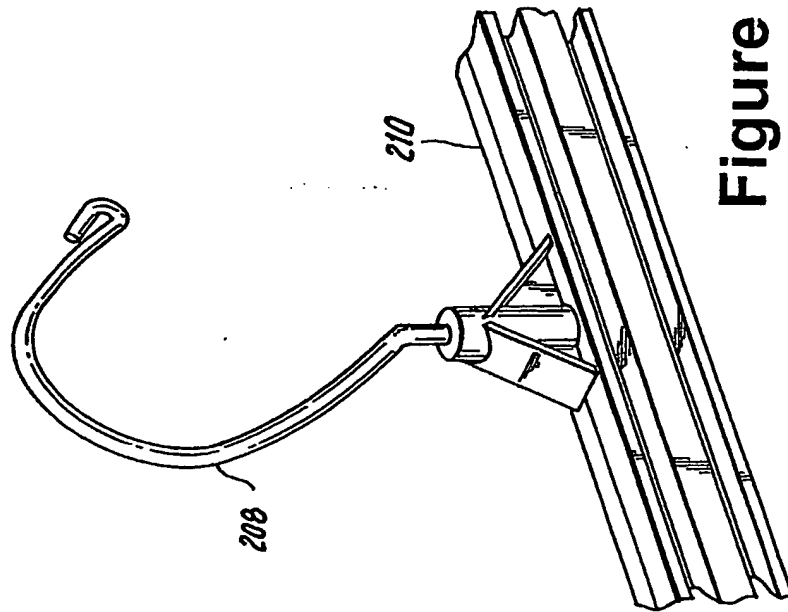
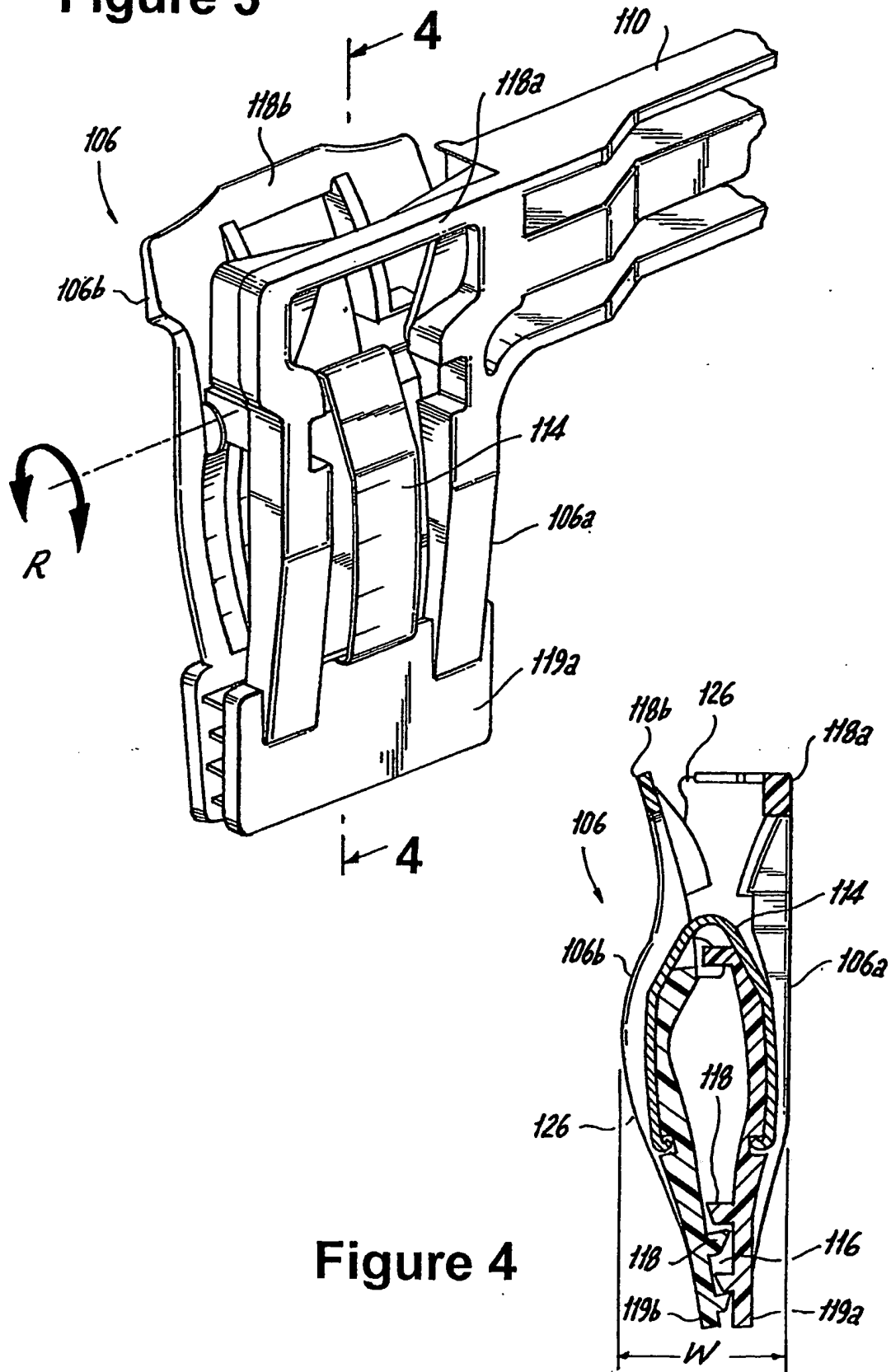
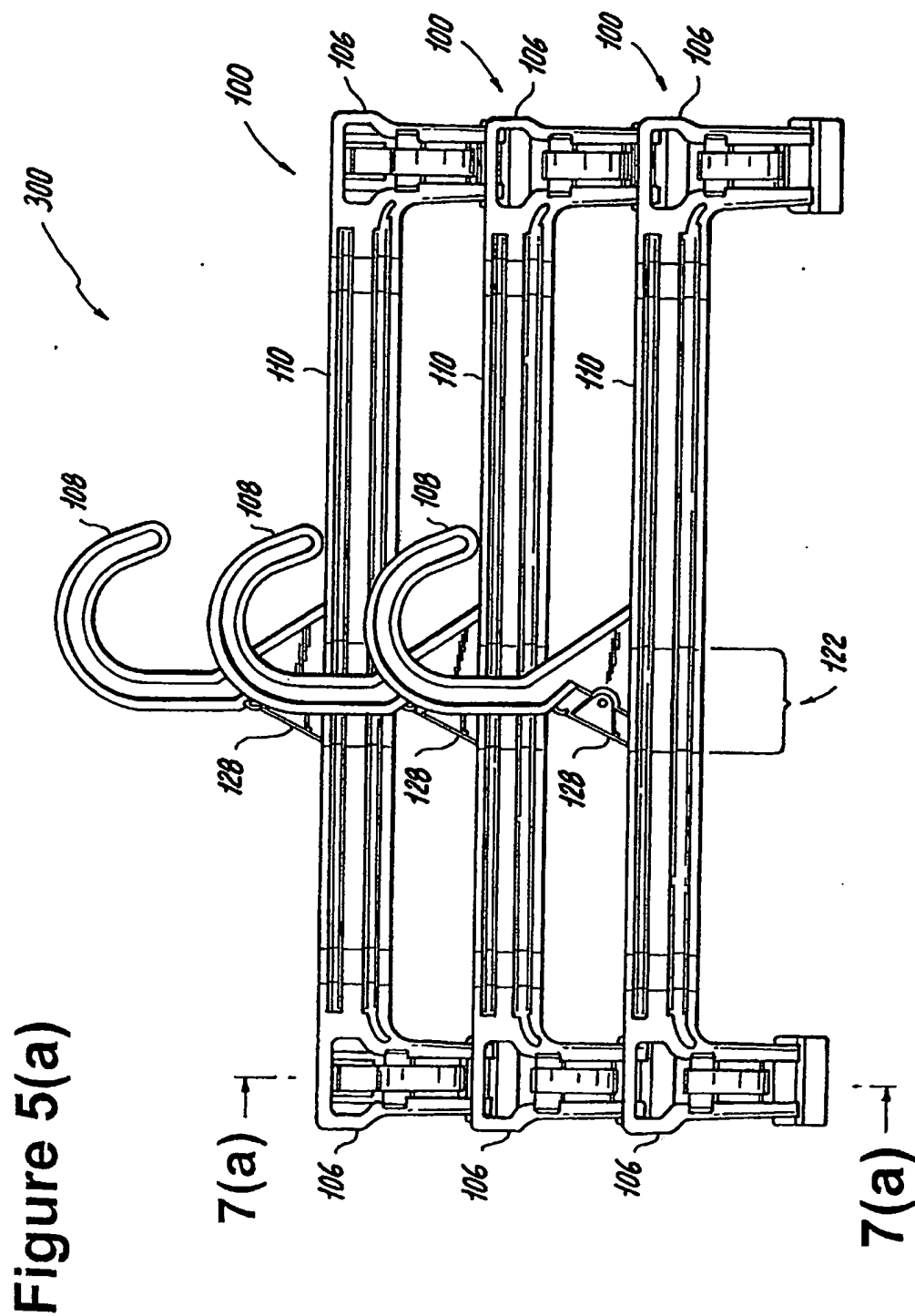


Figure 2(c)

Figure 3**Figure 4**

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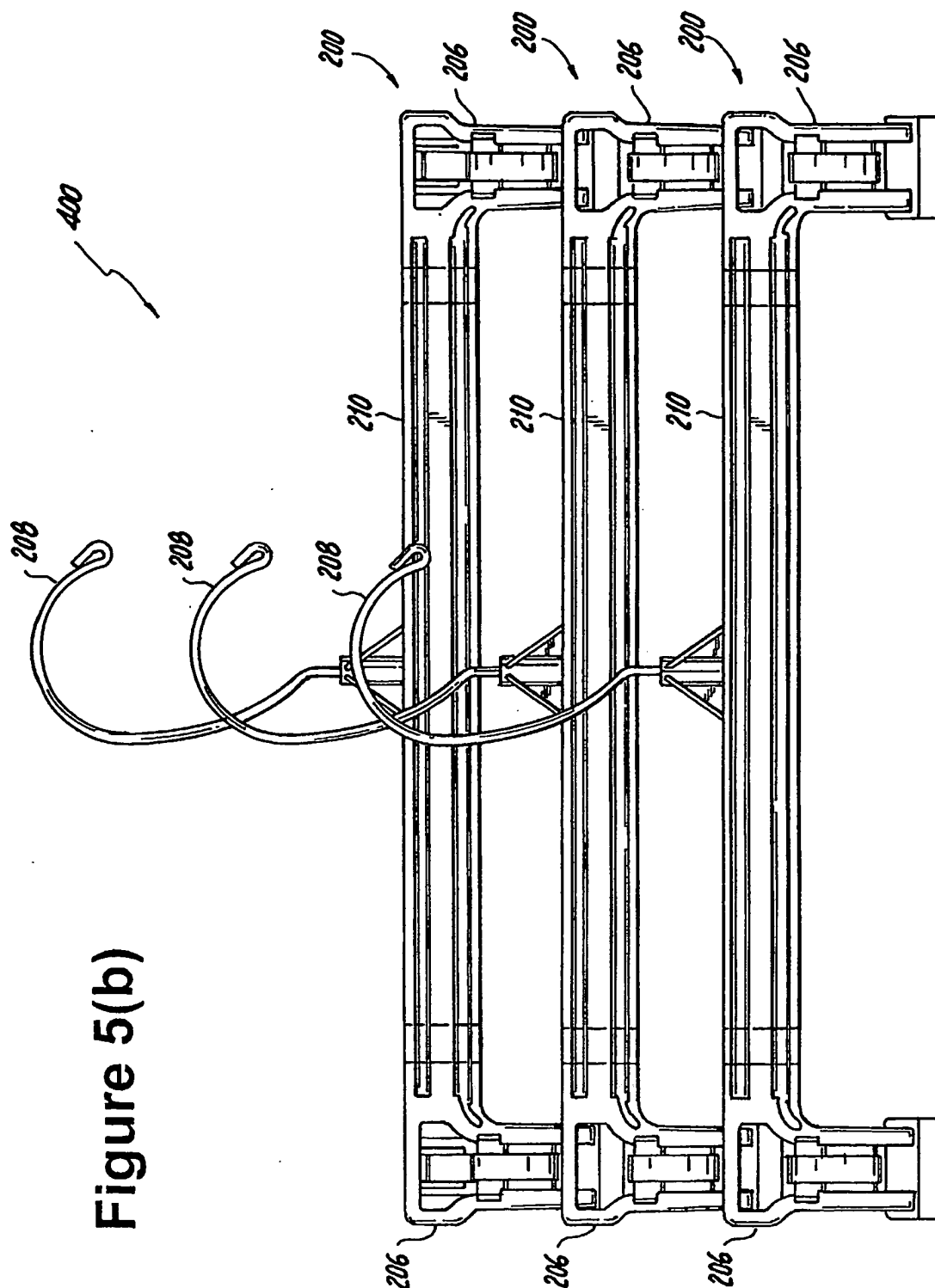


Figure 5(b)

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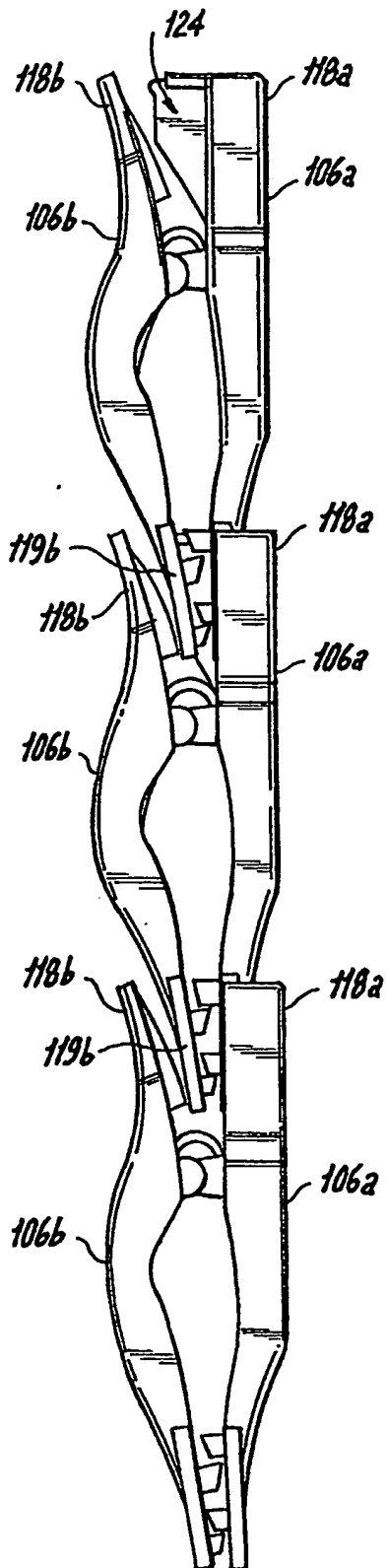


Figure 6

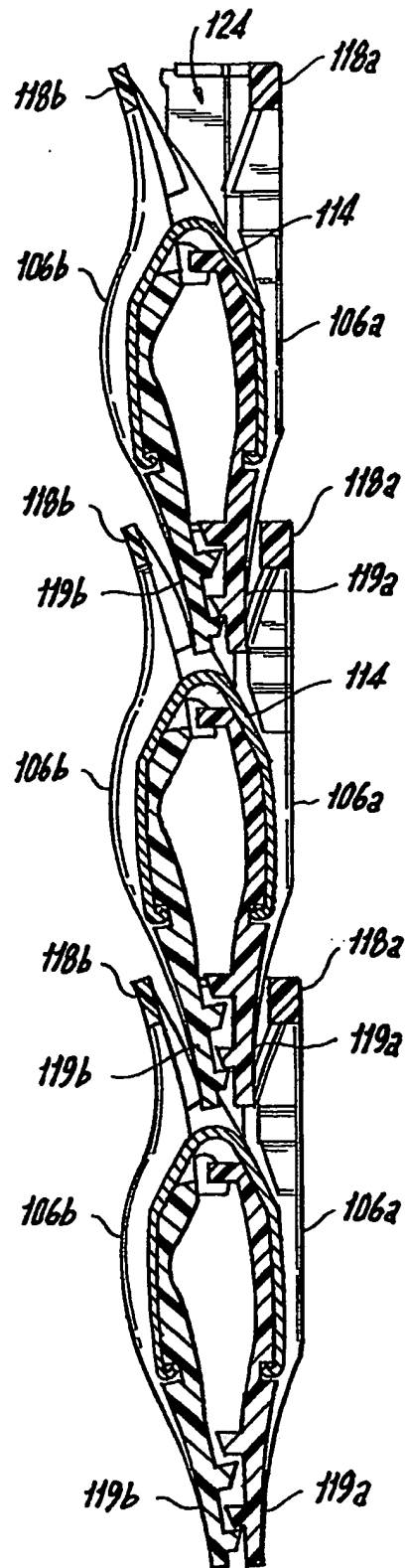
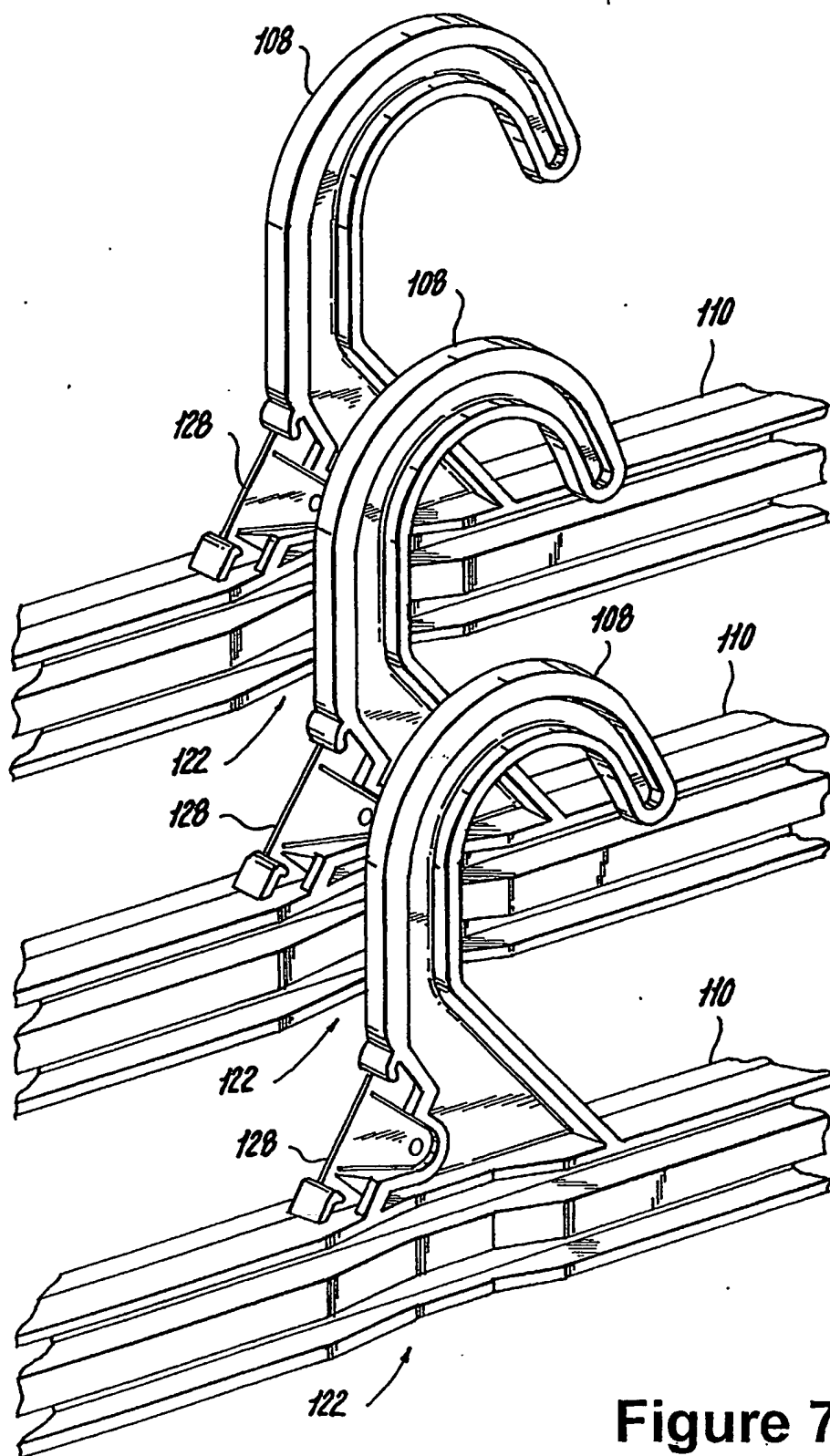
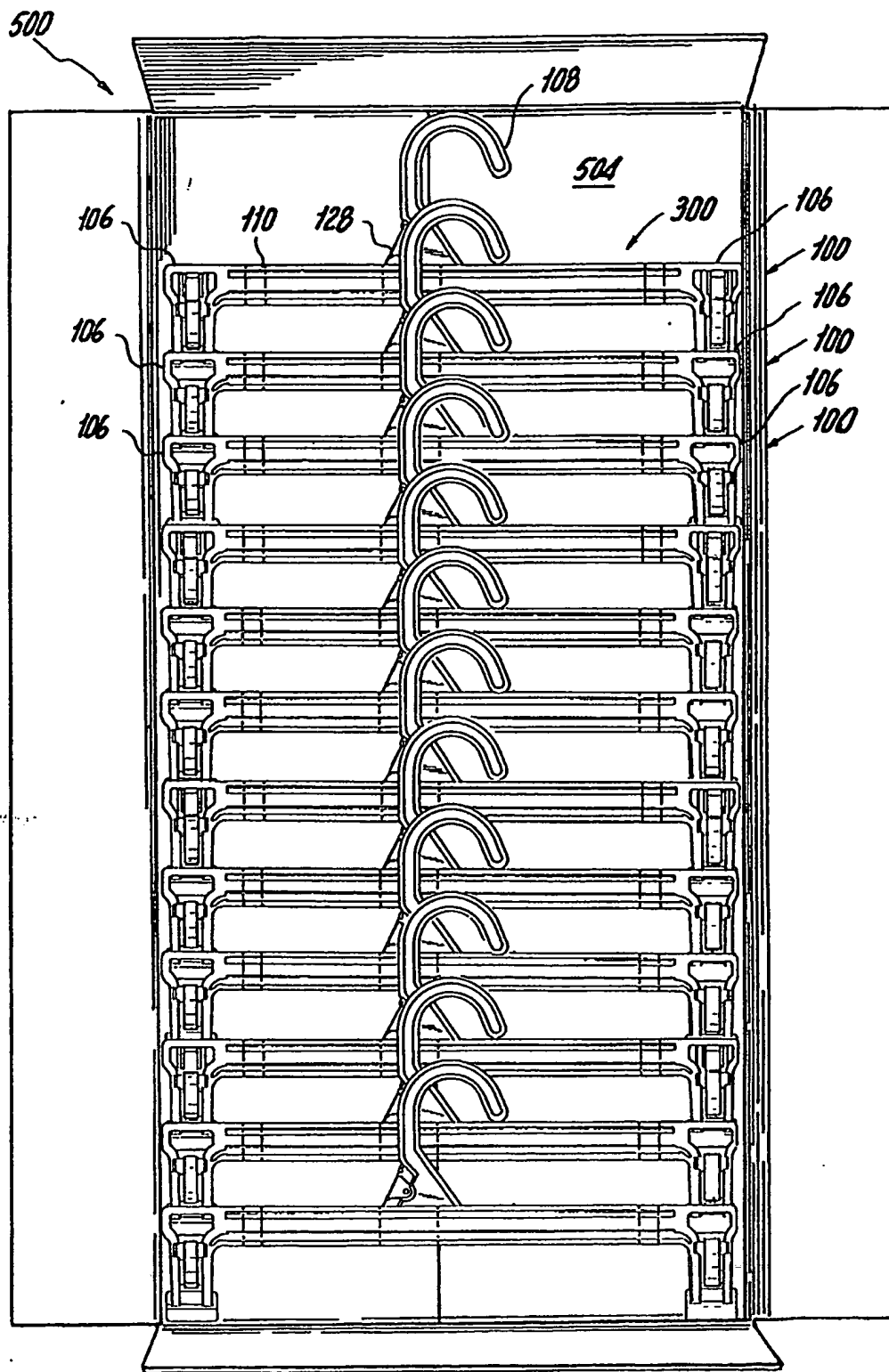


Figure 7(a)

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**Figure 7(b)**

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**Figure 8**

SUBSTITUTE SHEET (RULE 26)

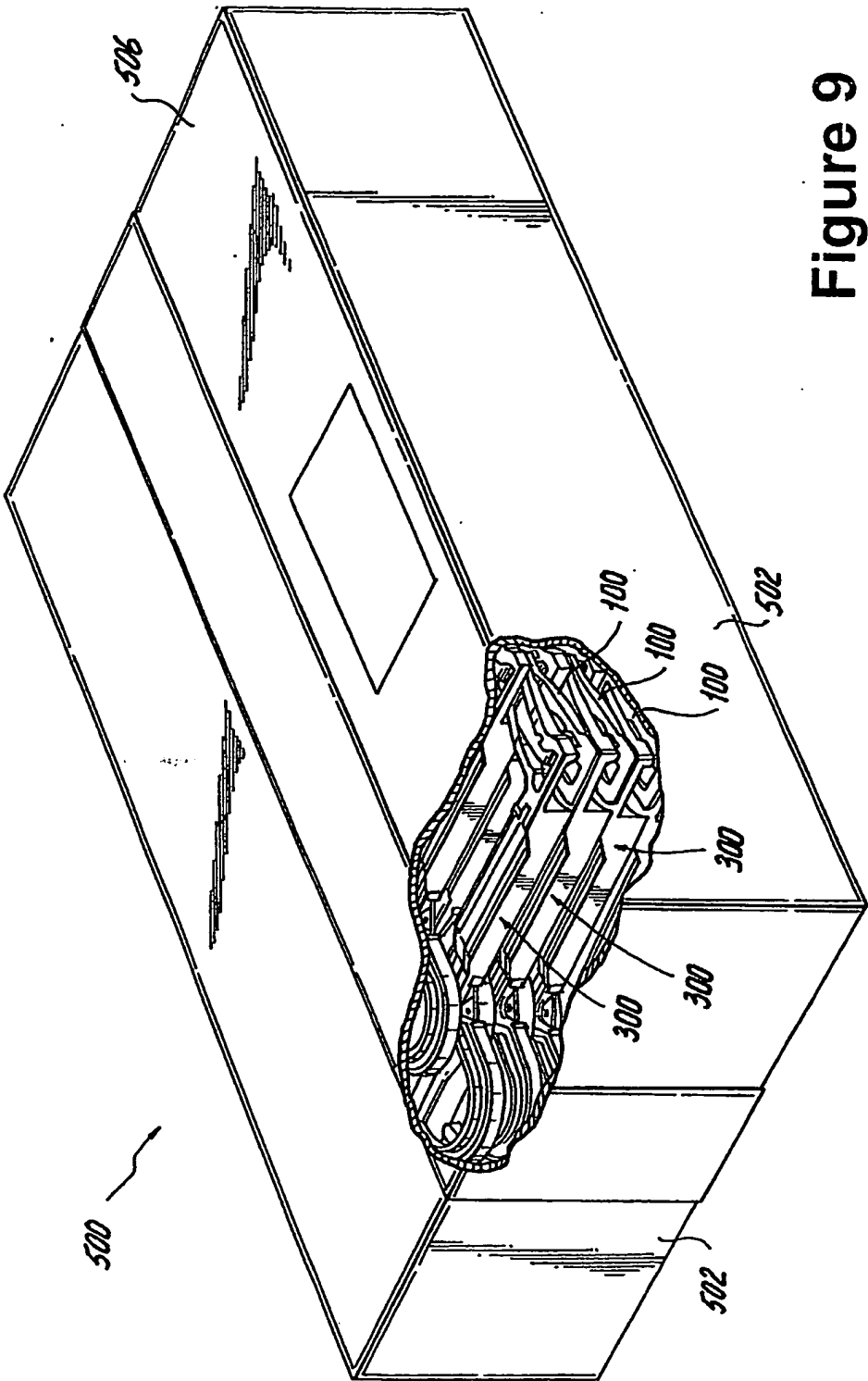


Figure 9

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Figure 10(a)

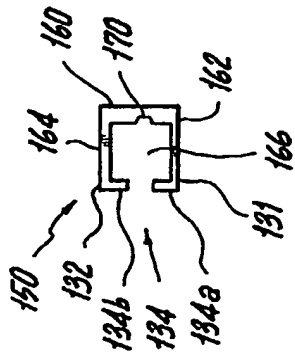


Figure 10(c)

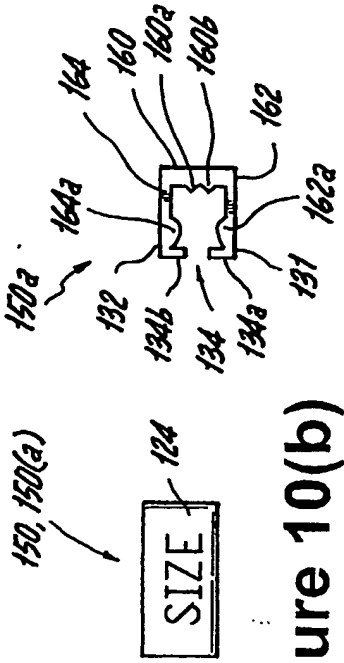


Figure 10(b)

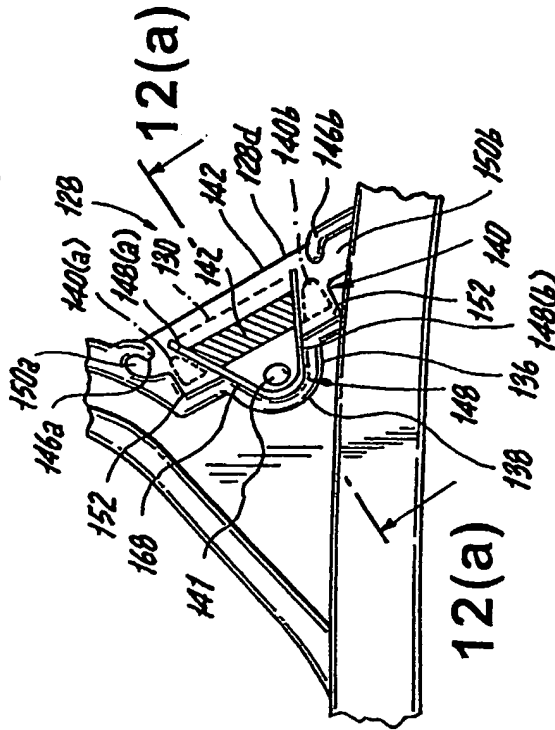


Figure 11(a)

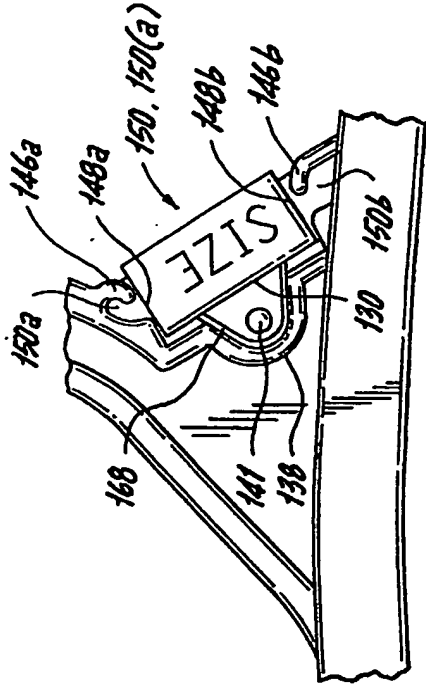
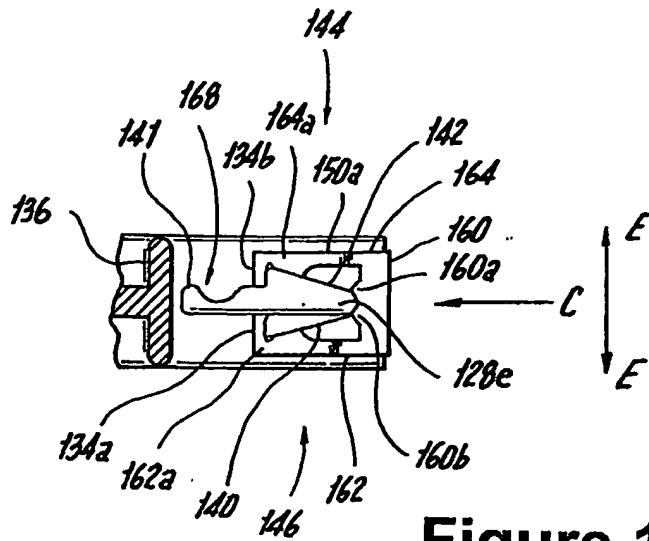
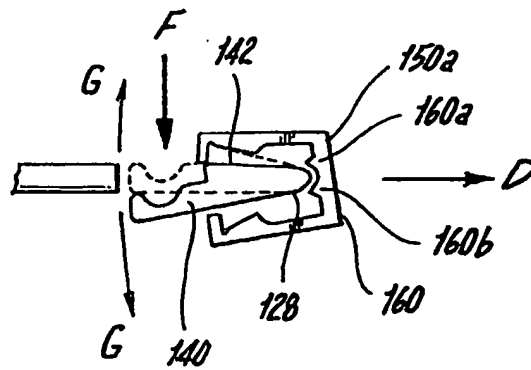


Figure 11(b)

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**Figure 12(a)****Figure 12(b)**

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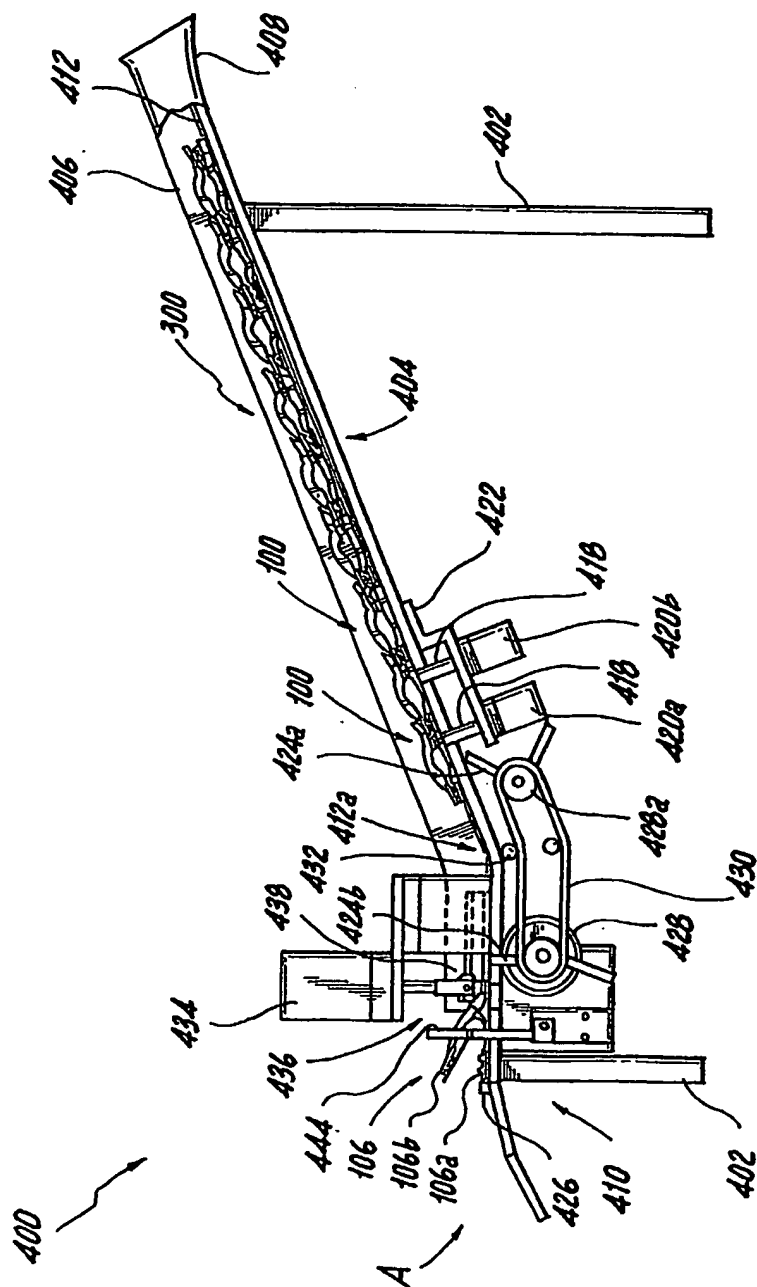


Figure 13

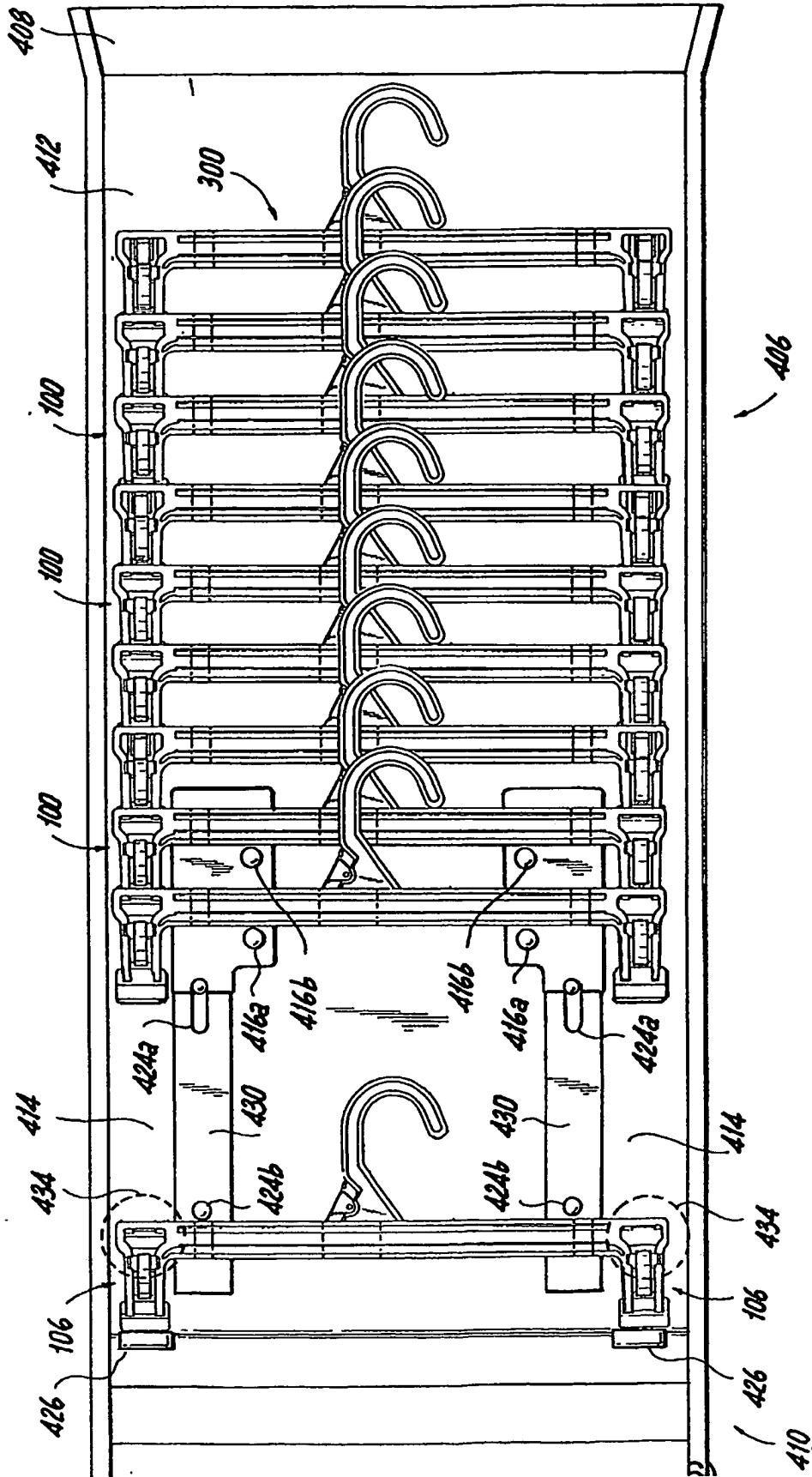


Figure 14

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US03/04563

A. CLASSIFICATION OF SUBJECT MATTER IPC(7) : B23P 21/00; B23Q 15/00 US CL : 29/714 According to International Patent Classification (IPC) or to both national classification and IPC		
B. FIELDS SEARCHED Minimum documentation searched (classification system followed by classification symbols) U.S. : Please See Continuation Sheet Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) EAST		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 4,383,362 A (GRANIERO et al.) 17 May 1983 (17.05.1983), see whole document.	1-20
Y	US 4,349,127 A (SAVARD, Jr.) 14 September 1982 (14.09.1982), see whole document.	1-20
Y	US 4,381,599 A (DUESTER et al.) 03 May 1983 (03.05.1983), see whole document.	1-20
A	US 5,285,566 A (MARSHALL et al.) 15 February 1994 (15.02.1994)	
A	US 5,507,086 A (MARSHALL et al.) 16 April 1996 (16.04.1996)	
A	US 5,272,806 A (MARSHALL et al.) 28 December 1993 (28.12.1993)	
A	US 3,824,671 A (WATKIN) 23 July 1974 (23.07.1974)	
A	US 3,859,710 A (BATTS et al.) 14 January 1975 (14.01.1975)	
A	US 4,873,878 A (MILTON) 17 October 1989 (17.10.1989)	
<input checked="" type="checkbox"/> Further documents are listed in the continuation of Box C. <input type="checkbox"/> See patent family annex.		
* Special categories of cited documents: "A" document defining the general state of the art which is not considered to be of particular relevance "B" earlier application or patent published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art "&" document member of the same patent family		
Date of the actual completion of the international search 21 April 2003 (21.04.2003)		Date of mailing of the international search report 29 APR 2003
Name and mailing address of the ISA/US Commissioner of Patents and Trademarks Box PCT Washington, D.C. 20231 Facsimile No. (703)305-3230		Authorized officer Greg Vidovich Telephone No. (703) 308-1148 <i>Sheila H. Vercy</i> Paralegal Specialist Tech. Center 3700

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INTERNATIONAL SEARCH REPORT

C. (Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5,568,685 A (MARSHALL et al.) 29 October 1996 (29.10.1996)	
A,P	US 6,421,910 B1 (MARSHALL et al.) 23 July 2002 (23.07.2002)	

INTERNATIONAL SEARCH REPORT

PCT/US03/04563

Continuation of B. FIELDS SEARCHED Item 1:

29/714, 787, 779, 809, 822, 243.56, 281.5, 241, 433; 221/194, 195, 196, 268, 270, 271, 272, 274, 276, 239, 255, 257; 223/91, 95, 96, 111